

## **REMARKS**

As an initial matter, Applicants thank the Examiner for the telephonic interview held on January 6, 2009, during which the present application and the prior art were discussed.

Claims 2-19, 21-30, 55, 56, 58, 60, and 62-67 stand presently rejected.<sup>1</sup> Claims 9, 11-14, 15, 27, 55, 58, and 62-67 are amended as set forth above. No new matter is contained in these amendments, and support for these amendments is found throughout the pending application, *e.g.*, at page 5, lines 14-20, page 11, line 3, page 12, lines 5-6, and page 13, lines 21-23.

Applicants submit that upon entry of the requested amendments, the pending claims are allowable. Applicants further traverse the pending rejections and submit that the rejections are improper and should accordingly be reconsidered and withdrawn.

### **I. OBJECTIONS**

#### **A. Abstract**

The office action objects to the abstract of the present application on the ground that the abstract exceeds 150 words (office action at page 2, citing MPEP § 608.01(b)).

Applicants thank the examiner for drawing their attention to this issue and have reduced the Abstract to 58 words, as set forth above. Applicants respectfully reserve the right to further amend the Abstract once an agreement has been reached regarding allowable subject matter in order that the Abstract best reflect the allowed subject matter.

#### **B. Claims**

The office action objects to claims 11-14 because these claims contain the abbreviation “pprn” instead of “ppm” (office action at page 2). Applicants thank the examiner for drawing their attention to this issue and have amended these claims.

### **II. REJECTIONS**

The office action alleges that certain of Applicants’ claims are obvious under 35 U.S.C. § 103(a) in light of various combinations of references. Applicants respectfully disagree and traverse each of these rejections in turn.

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<sup>1</sup> The office action states at page 2 that “[c]laims 2-19, 21-30, 55, 56, 58, 60, and 62-70 are pending.” Applicants respectfully observe that the instant application contains claims only up through claim 67. Accordingly, the present submission does not address the rejections of claims 68-70.

#### A. Legal Standard

To establish a *prima facie* case of obviousness under 35 U.S.C. § 103(a), there must be a clearly articulated reason or rationale, either in the prior art itself or in the knowledge generally available to one of ordinary skill in the art, why the claimed invention is obvious in light of a reference or combined reference teachings. MPEP §§ 2143, 2143.01; *KSR International Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1739-43 (2007). There must also be a reasonable expectation of success. MPEP § 2143.02. The prior art combination must address every element of the claim at issue. MPEP § 2143.03. The rationale to make the claimed combination and the reasonable expectation of success must be found in the prior art and may not be based on the applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 493 (Fed. Cir. 1991).

#### B. Discussion

##### 1. The Rejections of Claims 2, 9, 10-12, 15, 16, 18, 21, 27, 30, 62, 63, 65, and 66 Over Cable in view of Isenberg Are Improper

The office action alleges that claims 2, 9, 10-12, 15, 16, 18, 21, 27, 30, 62, 63, 65, and 66 are obvious over Cable (U.S. Patent 5,445,903) in view of Isenberg (U.S. Patent 4,812,329) (office action at pages 3-8). Applicants submit that the rejection should be withdrawn because the proposed combination of references is improper and because the combination does not suggest or otherwise address every element of the cited claims.

###### a. Because Cable and Isenberg Expressly Teach Away From Their Combination, The Cable-Isenberg Combination Is Improper and Cannot Support the Obviousness Rejection

The office action suggests that Cable and Isenberg may be combined to arrive at the claimed invention (office action at pages 3-8). But because the cited references teach away from combination with one another *and* from the claimed invention, the proposed combination is improper and cannot support the rejection. *See* MPEP § 2145.X.D.2.

A review of Cable and Isenberg makes clear that the cited references teach away from combination with one another. The Background section of Cable '903 expressly criticizes the electrodes described by Isenberg in US Patent 4,582,766, noting that in devices made according to Isenberg, the electrolyte is bound to the electrode, which bonding results in undesirable mechanical and structural complications (*see* Cable '903 at col. 2, lines 38-41). The Cable reference then states that the shortcomings of the Isenberg invention may be overcome by avoiding bonding between the electrode and electrolyte, which may be

accomplished through positioning an element between the electrode and the electrolyte (Cable at col. 2, lines 46-52). Like the devices described in the Isenberg '766 patent, the devices in the Isenberg '329 patent cited by the pending office action likewise include an electrode that is bonded to the electrolyte (*see* Isenberg '329 patent at, *e.g.*, **FIG. 1**), and the Cable reference is clear that bonding the electrode to the electrolyte is to be avoided. Accordingly, the references teach away from their combination, and the combination is thus improper under the MPEP. *See* § MPEP 2145.X.D.2.

The cited references likewise teach away from the claimed invention. While the claimed invention recites that the anode and electrolyte are secured to one another, the cited Cable '903 reference expressly criticizes such bonding and instead advocates the disposition of so-called "microslip zones" between the electrolyte and the electrode components (Cable '903 at col. 5, lines 53-68). Because the MPEP is clear that a reference cannot render a claimed invention obvious when the reference teaches away from the claimed invention, MPEP § 2145.X.D.2, the proposed combination cannot support the proposed rejection.

Applicants note that the office action asserts at pages 21-22 that Cable '903 and Isenberg are combinable first because although the Cable 5,589,285 reference (cited in an earlier office action) is no longer relied upon,<sup>2</sup> "Cable '903 does not have the bonding of the conductive particles as Isenberg does." But this argument merely underscores the incompatibility of the Cable '903 and Isenberg '329 references because Cable '903 *plainly criticizes* bonding between the electrode, and Isenberg '329 (*see* **FIG. 2** of Isenberg '329) *plainly includes* such bonding. Thus, given that Cable '903 unambiguously criticizes Isenberg's (and Applicants') approach, the combination of Cable '903 with Isenberg '329 is improper under MPEP § 2145.X.D.2 and cannot support the pending rejections.

Further, the office action's reliance on Cable '903 and Isenberg only for the purposes of sulfur tolerance is improper because the MPEP does not permit an office action to selectively rely on only those parts of a reference that are most helpful to the office action's position. Instead, an office action must address *all* parts of a prior reference and can not

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<sup>2</sup> Applicants note that the office action states that Cable '903 is relied upon as the primary reference (office action at 20-21) and that the office action repeatedly refers to Applicants' arguments addressing the Cable '285 reference as "moot." Applicants accordingly understand that all rejections based on the Cable '285 reference have been withdrawn in light of the office action's reliance on the Cable '903 reference.

apply only certain parts of the reference; “[a] prior art reference must be considered *in its entirety*, *i.e.*, as a whole, including portions that would lead away from the claimed invention.” MPEP § 2143.02.VI (emphasis added). Thus, by failing to account for the fact that the cited references plainly teach away from combination with one another and from the claimed invention, and by further failing to explain why one of ordinary skill would ignore this teaching away, the office action’s analysis is contrary to MPEP § 2143.02.VI. The office action’s justification for the Cable-Isenberg combination selectively relies on only particular aspects of the cited references to arrive at the claimed invention, and does not explain why one of ordinary skill would ignore the references’ explicit teaching away from their combination. Accordingly, because the office action’s rejection cannot be reconciled with MPEP § 2145.X.D (“it is improper to combine references where the references teach away from their combination”), the rejection should be reconsidered and withdrawn.

**b. Even If Cable and Isenberg Were Properly Combinable, The Combination Fails to Address Every Element of the Cited Claims**

Even if the Cable-Isenberg combination were proper – which Applicants do not concede – the combination nonetheless fails to address every element of the cited claims and cannot support the rejection under 35 U.S.C. § 103(a).

The cited claims recite, *inter alia*, “a fuel comprising a hydrocarbon having 2 or more carbons, and the fuel being characterized as having a sulfur content of from about 1 ppm to about 5000 ppm.” The office action concedes at page 6 that Cable ‘903 does not disclose this element, but the office action nonetheless asserts that Isenberg discloses this element (office action at page 6, citing Isenberg at col. 2, lines 60-67 and col. 7, lines 1-20) and further asserts that “H<sub>2</sub>, CO, and methane are art-recognized equivalents, and it would have been obvious to one of ordinary skill in the art, at the time the invention was made to substitute an of the art recognized equivalents for fuel with the predictable result of it functioning in a solid oxide fuel cell” (office action at page 7). Applicants respectfully submit that the office action over-reads the prior art.

First, the office action’s statement that “H<sub>2</sub>, CO, and methane are art-recognized equivalents, and it would have been obvious to one of ordinary skill in the art, at the time the invention was made to substitute an of the art recognized equivalents for fuel with the

predictable result of it functioning in a solid oxide fuel cell” (office action at page 7) does not support the asserted rejection. While one of skill might substitute one “art-recognized equivalent” material for another (e.g., substituting CO for H<sub>2</sub>), the office action provides no reasoning to support its argument that one of skill in the field would substitute a two-carbon hydrocarbon fuel – which fuel is *not* among the office action’s list of “art-recognized equivalents” for one of the three enumerated “art-recognized equivalents.” To the extent the office action bases its rejection on the premise that a two-carbon (or greater) fuel is inherently equivalent to the “art-recognized equivalents” of H<sub>2</sub>, CO, and methane, MPEP § 2112 is clear that “the mere fact that a certain characteristic or result *may* occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic.” *See also In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999) (“Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.”); *Perricone v. Medicis Pharm. Corp.*, 432 F.3d 1368, 1379 (Fed. Cir. 2005) (rejection based on feature allegedly inherent in prior art improper where rejection “assume[d] what [the prior art] neither disclosed nor rendered inherent”). Accordingly, the office action’s suggestion – without any citation to any evidence or authority – that two-carbon fuels are equivalent to H<sub>2</sub>, CO, or methane is impermissible speculation that the MPEP does not permit, and such speculation cannot support the asserted rejections.

In any event, two-carbon fuels are not interchangeable with H<sub>2</sub>, CO, and methane, as applied to the cited references. Isenberg describes only nickel-containing devices (*see* Isenberg at col. 5, lines 65-68), and the claims at issue recite devices that are substantially nickel-free. Further, as explained in the attached affidavit of co-inventor Dr. Raymond Gorte, in a nickel-containing device, such as the device set forth in Isenberg, undesirable carbon formation would occur if two-carbon (or larger) hydrocarbons were passed over a nickel-containing fuel cell. Thus, Isenberg is unsuitable for the two-carbon fuels recited in the claimed invention. Accordingly, the Isenberg reference does not cure the acknowledged deficiency of the Cable ‘903 reference, and the Isenberg-Cable combination fails to address every element of the cited claims, and the rejection of these claims should accordingly be reconsidered and withdrawn. Because the rejections of claims 62, 63, 65, and 66 are improper and should be withdrawn, the obviousness rejections of all dependent claims related to claims 62, 63, 65, and 66 – *i.e.*, claims 2, 9, 10-12, 15, 16, 18, 21, 27, and 30 – should

likewise be withdrawn and these dependent claims should be allowed. *See In re Fine*, 837 F.2d 1071, 1076 (Fed. Cir. 1988) (a claim depending from a non-obvious independent claim is itself nonobvious).

**2. The Rejections of Claims 3, 5-8, 22, 24-26, 28, and 29 Over Cable ‘903 in Light of Isenberg and in Further View of Keegan Are Improper**

The office action alleges at page 8 that claims 3, 5-8, 22, 24-26, 28, and 29 are obvious over Cable ‘903 in view of Isenberg as applied to claims 62, 2, 63, and 21, and in further view of U.S. Patent 6,423,896 to Keegan (“Keegan”). Applicants respectfully disagree on the grounds that independent claims 62 and 63 are non-obvious over the Cable-Isenberg combination as explained above, and that the addition of Keegan does not cure the deficiencies of Cable and Isenberg. The office action relies on Keegan only to supply a listing of possible hydrocarbon fuels (office action at pages 8-10), but Keegan does not cure the structural incompatibility of Cable and Isenberg, and, in any event, Keegan’s listing of hydrocarbon fuels is incompatible with the devices described in Isenberg, as set forth above. Accordingly, because independent claims 62 and 63 are non-obvious over the proposed combination, all claims that depend from these non-obvious independent claims are themselves non-obvious. *In re Fine*, 837 F.2d at 1076. Accordingly, the rejections of claims 3, 5-8, 22, 24-26, 28, and 29 are improper and should be withdrawn.

**3. The Rejections of Claims 4, 13, 14, and 23 Over Cable in Light of Isenberg and in Further View of Keegan and Anumakonda Are Improper**

The office action alleges at page 10 that claims 4, 13, 14, and 23 are obvious over Cable in light of Isenberg as applied to claims 62, 2, 10-12, and 21, in view of Keegan as applied to claims 2 and 22, in further view of U.S. Patent 6,221,280 to Anumakonda (“Anumakonda”). Applicants respectfully disagree on the grounds that independent claims 62 and 63 are non-obvious in light of Cable and Isenberg as explained elsewhere in this submission, and that all claims that depend from these non-obvious independent claims are themselves non-obvious. *In re Fine*, 837 F.2d at 1076. Accordingly, the rejections of claims 4, 13, 14, and 23 should be reconsidered and withdrawn.

**4. The Rejections of Claims 17 and 19 Over Cable in Light of Isenberg and in Further View of Wallin Are Improper**

The office action alleges at page 13 that claims 17 and 19 are obvious over Cable in light of Isenberg as applied to claims 62, 15, and 16, in view of U.S. Patent 6,017,647 to Wallin (“Wallin”). Applicants respectfully disagree on the grounds that independent claims 62 and 63 are non-obvious in light of Cable and Isenberg as explained elsewhere in this submission, and that any claims that depend from non-obvious independent claims are themselves non-obvious. *In re Fine*, 837 F.2d at 1076. Accordingly, the rejections of claims 17 and 19 should be withdrawn.

**5. The Rejections of Claims 55, 56, 58, and 60 Over Cable ‘903 in Light of Isenberg and in Further View of Cable ‘285 Are Improper**

The office action alleges at page 14 that claims 55, 56, 58, and 60 are obvious in light of Isenberg, as applied to claims 62, 63, 65, and 66 and in further view of U.S. Patent 5,589,285 to Cable (“Cable”). Applicants respectfully disagree on the grounds that independent claims 62, 63, 65, and 66 are non-obvious in light of Isenberg as explained elsewhere in this submission, and that any claims that depend from these non-obvious independent claims are themselves non-obvious. *In re Fine*, 837 F.2d at 1076. Moreover, given that Cable ‘285 also criticizes the bonded electrode-to-electrolyte approach of both Isenberg and of the claimed invention, Applicants submit that the inclusion of the Cable ‘285 reference underscores that the Cable-Isenberg combination is improper because the references teach away from their own combination and from the claimed invention. Further, as described in Applicants’ earlier submissions, the Cable ‘285 reference describes an electrolyte (see, e.g., FIG. 1 of Cable ‘285) that is *physically separated* from the anode and cathode, which separation is fundamentally opposed from the direct physical contact between the electrode and anode recited in Applicants’ claims. Accordingly, the asserted rejections of claims 55, 56, 58, and 60 should be reconsidered and withdrawn.

**6. The Rejections of Claims 64 and 67 Over Cable ‘903 in Light of Isenberg and in Further View of Cable ‘285 Are Improper**

The office action alleges at page 15 that claims 64 and 67 are obvious in light of Eisenberg and in further view of Cable. Applicants respectfully disagree on the grounds that, as set forth elsewhere herein, that the Cable-Isenberg combination is improper and that the

combination does not address every element of Applicants' claims. Accordingly, the rejections of claims 64 and 67 are improper and should be withdrawn.

### **III. CONCLUSION**

For all of the foregoing reasons, Applicants submit that the pending objections and the pending rejections of certain claims under 35 U.S.C. § 103(a) are improper and should be reconsidered and withdrawn. Accordingly, Applicants respectfully request that the examiner (1) enter the requested amendments to the claims; (2) reconsider and withdraw the pending objections and rejections; and (3) pass claims 2-19, 21-30, 55, 56, 58, 60, and 62-67 to allowance.

Applicants respectfully submit that the present application is in condition for allowance. If the examiner believes that additional communication will expedite prosecution of this application, the examiner is invited to telephone the undersigned at the number provided. Favorable consideration and an early notice of allowance are respectfully requested.

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